

WHAT IS CLAIMED IS:

1. A material for an actuator film which is dipped in an electrolyte solution and expands/contracts in accordance with the application of a voltage, said material being imparted with a high electron conductivity by dispersing conductive fine particles in an ion conductive polymer material having a capacity of capturing a negative or positive electrolyte ion ionized in the electrolyte solution by the application of a voltage.

2. A material for an actuator film of Claim 1, wherein the ion conductive polymer material is a perfluorosulfonic acid copolymer, perfluorocarboxylic acid copolymer, polystyrenesulfonic acid copolymer or polystyrenecarboxylic acid copolymer.

3. A material for an actuator film of Claim 1, wherein the conductive fine particles are micro conductors which are carbon fine particles, platinum fine particles, gold fine particles or carbon nanotube, or mixture thereof.

4. An actuator film which is dipped in an electrolyte solution together with electrodes and expands/contracts by the application of a predetermined voltage between the electrodes, said actuator film comprising a material being imparted with a high electron conductivity by dispersing conductive fine particles in an ion conductive polymer material having a capacity of capturing a negative or positive

electrolyte ion ionized in the electrolyte solution by the application of a voltage.

5 5. An actuator film of Claim 4, wherein the ion conductive polymer material is a perfluorosulfonic acid copolymer, perfluorocarboxylic acid copolymer, polystyrenesulfonic acid copolymer or polystyrenecarboxylic acid copolymer.

10 6. A material for an actuator film of Claim 4, wherein the conductive fine particles are micro conductors which are carbon fine particles, platinum fine particles, gold fine particles or a carbon nanotube, or mixture thereof.

15 7. An actuator comprising an actuator film, an electrode disposed opposite to the actuator film, an electrolyte solution in which the actuator film and the electrode are to be dipped, and a voltage supply for applying a predetermined voltage between the actuator film and the counter electrode, said actuator film comprising a material being imparted with a high
20 electron conductivity by dispersing conductive fine particles in an ion conductive polymer material having a capacity of capturing a negative or positive electrolyte ion ionized in the electrolyte solution by the application of a voltage.

25 8. An actuator film of Claim 7, wherein the actuator film comprises the ion conductive polymer material and conductive fine particles and electric connection between the actuator film and the voltage

supply for applying a predetermined voltage between the actuator film and the counter electrode is conducted only at an end portion of the actuator film.

5 9. An actuator film of Claim 7, wherein the actuator film comprises the ion conductive polymer material and conductive fine particles and electric connection between the actuator film and the voltage supply for applying a predetermined voltage between the actuator film and the counter electrode is conducted at
10 an end portion of the actuator film and a metal electrode disposed spirally on the surface of the actuator film.

15 10. An actuator of Claim 7, wherein the actuator film has a structure having thin films of the ion conductive polymer material and the conductive fine particles and metal thin-film electrodes stacked alternately one after another.

20 11. An actuator of Claim 7, wherein the actuator film comprises a plurality of unit actuator films composed of a material mixture of the ion conductive polymer material and the conductive fine particles and a flexible resin thin-film having a surface covered with a conductor; and on both surface of the conductors on both sides of the resin thin-film, the plurality of
25 unit actuator films are disposed regularly in one row in the direction of expansion/contraction.

12. An actuator of Claim 10, wherein the metal electrodes are independent and connected each other via

a conductive wire.

13. An expansion/contraction type actuator of Claim 10, wherein a folded but continuous metal foil constitutes the metal electrodes.

5